

# Analysis and mapping of crime perception: A quantitative approach of sketch maps



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A sketch map is the primary mapping method to depict the spatial knowledge and perception of individuals graphically. Crime studies are one of the research areas which makes use of sketch maps to collect data about spatial crime perception [1,2], to identify the perceived safe and unsafe places.

Evidence exists that people's perception of crime is not often consistent with actual crime statistics [3]. Thus, people tend to underestimate or overestimate the crime rate, this is known as the crime perception gap. The misperception of crime can have repercussion on people's lifestyle, affect social behaviour and spatial and economic dynamics [4].

Therefore, it is relevant to develop strategies directed to reduce this gap.

## OBJECTIVE & WORK FLOW

The aim of this research project is:

*"To quantitatively examine structured sketch maps to analyse and map crime perception. Moreover, to design a GeoVisual Analytics (GVA) environment that eases the decision-making in the development of strategies to amend the crime perception"*

To address this general objective, the research was divided into three stages, which tackles the specific objectives and are associated with the Principles of Geography to follow a systems approach (Fig. 1).

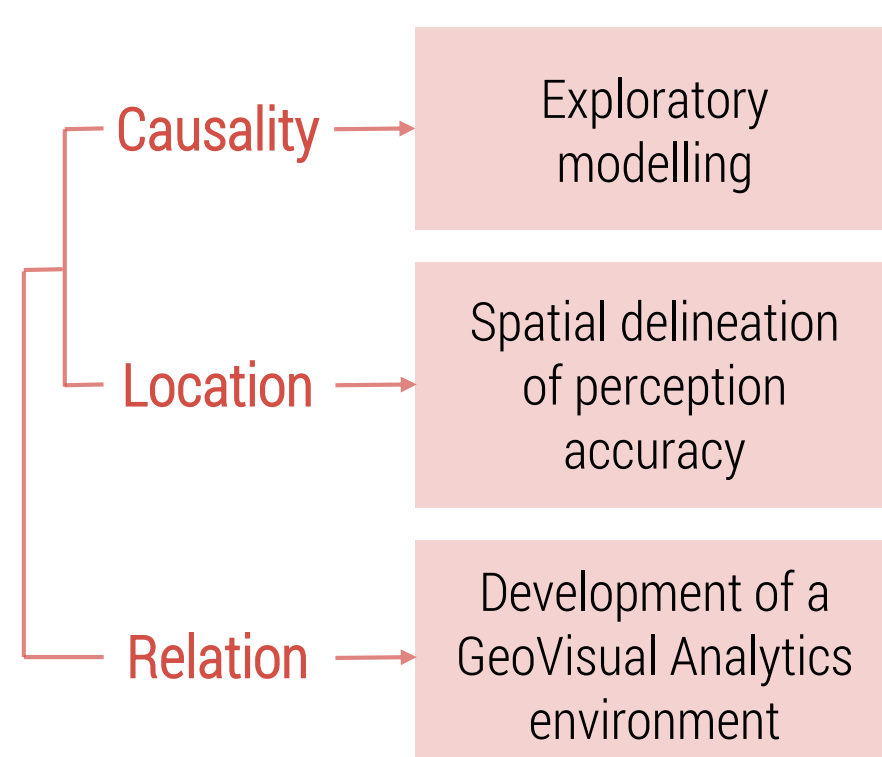


Fig. 1, Stages of the research process.

## EXPLORATORY MODELLING

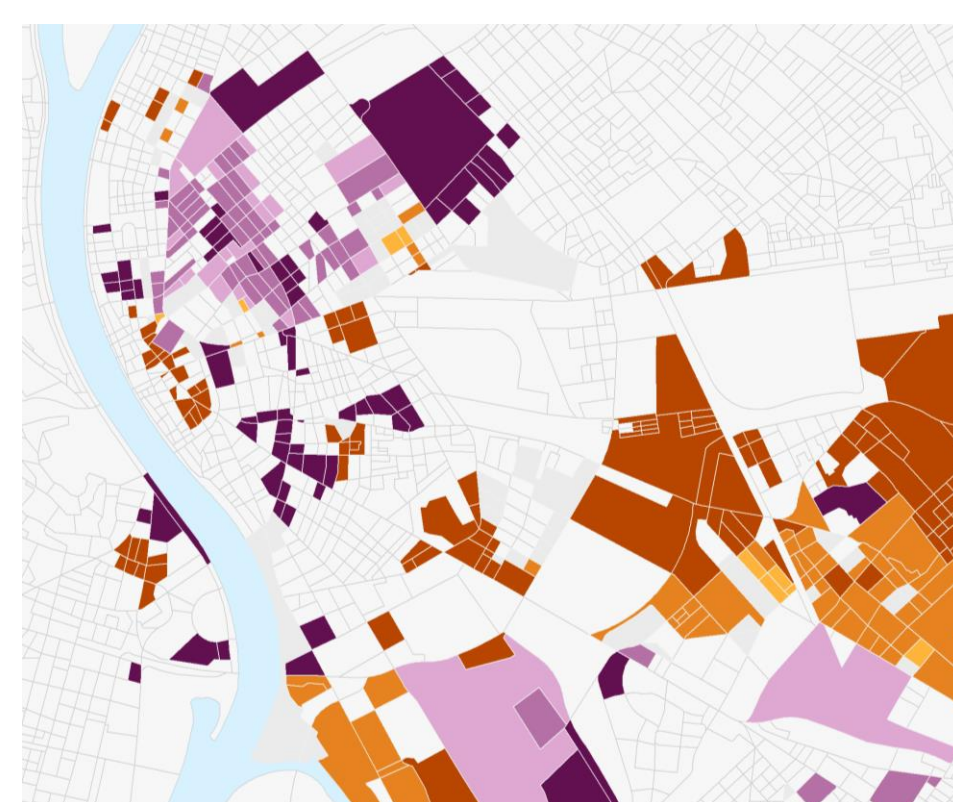
This stage consists in data extraction from structured sketch maps (the sketch of features over a digital or printed base map) and its analysis by performing a Binary Logistic Regression to define the factors related to the crime perception.

The results indicated that the likelihood of perceiving an area as unsafe increases

when this target area is far away from a person's neighbourhood and daily route, and from a crime hotspot and a high crime intensity area.

## SPATIAL DELINEATION OF PERCEPTION ACCURACY

The first part of this stage comprises the definition of the spatial distribution of the type and level of crime perception accuracy. The outcomes showed that the crime perception gap involves both the overestimation of safe areas and the underestimation of unsafe area (Fig. 2).



Class	Perceived	Safe	Unsafe
	Reference	Unsafe	Safe
Level of inaccuracy	Low		
	Medium		
	High		

Fig. 2, Level of inaccurate perception of safe and unsafe areas per block (example from Budapest, 2017).

The second part entails calculating the Bivariate Local Moran's I statistic to identify the relation between two variables in adjacent locations. With this analysis, it was possible to identify the blocks where

people have an inaccurate perception of safeness and could be explained by the number of incidents in adjacent blocks.

Thus, misperception of crime could be the result of transferring the safeness attributes from neighbouring blocks to a target block.

## DEVELOPMENT OF A GVA ENVIRONMENT

In this stage, a prototype of a GVA interface, that integrates perception data, tools, graphic representations and views that ease the identification of spatial patterns, structures, changes and relations in a multiscale environment is presented (Fig. 3).

The purpose of the interface is to assist police agencies in the development of strategies towards narrowing the crime perception gap by getting to know the spatial context of the problem.

## CONCLUSIONS

The presented methodology takes account of data extracting, exploration and quantitative analysis with the incorporating of GIS, spatial analysis and statistics to enabled an integral understanding of the perception of crime from structured sketch maps.

The development of a GeoVisual Analytics interface that supports spatiotemporal crime perception data to analyse the spatial arrangement of the crime perception accuracy within a contextual scenario could ease the creation of action plans directed to increasing the accuracy of perception.

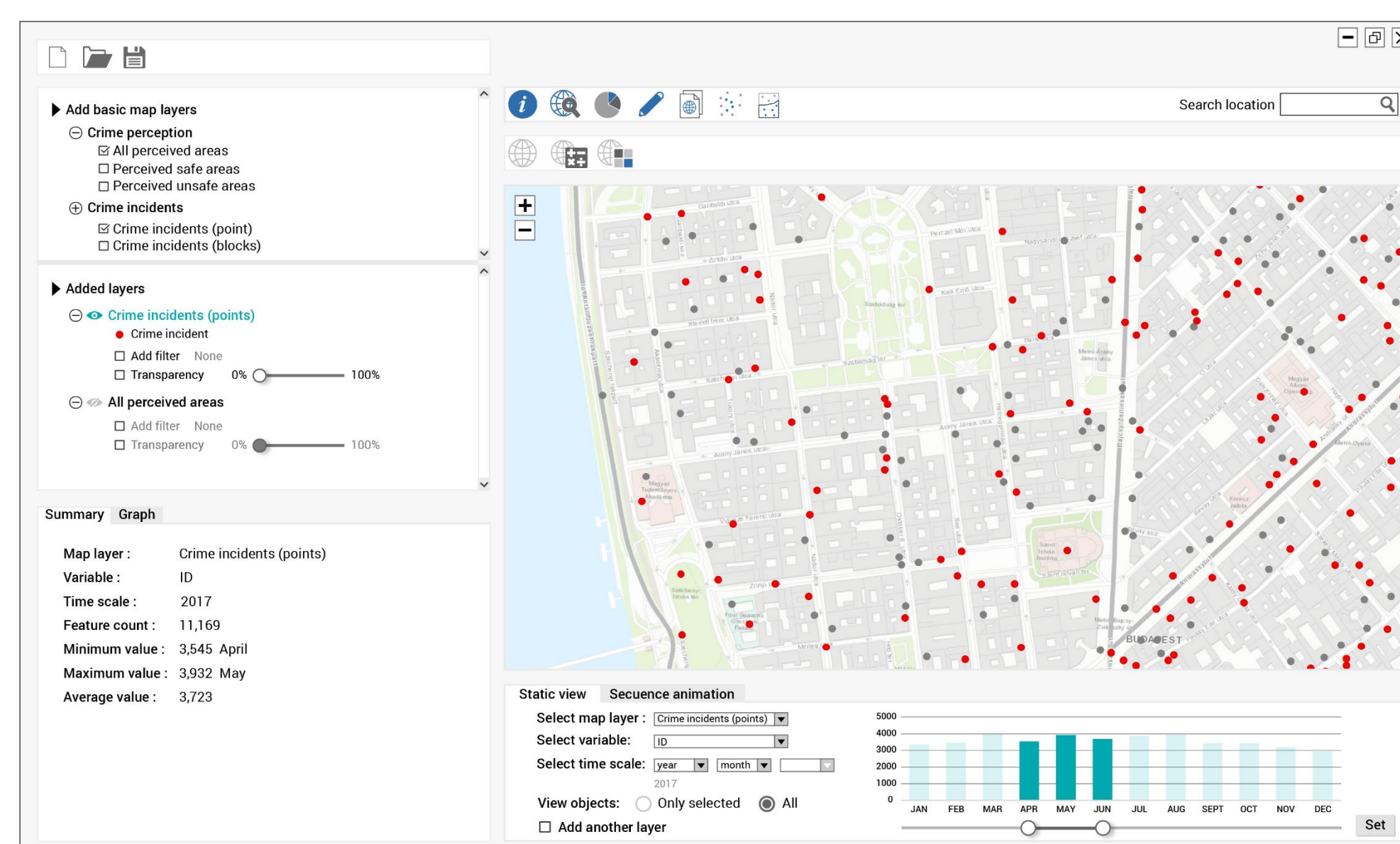


Fig. 3, Detailed low-fidelity prototype of the proposed GVA interface for crime perception data.

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## KEYWORDS

Structured sketch maps, crime perception gap, bivariate logistic regression, GeoVisual Analytics.

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